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SEQUENCE LISTING

<110> Isis Innovation Limited

<120> Process for oxidising aromatic compounds

<130> N76277A PEJ

<170> PatentIn Ver. 2.1

<210> 1

<211> 1242

<212> DNA

<213> Pseudomonas putida

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<221> CDS

<222> (1)..(1242)

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acg act gaa acc ata caa agc aac gcc aat ctt gcc cct ctg cca ccc    48
Thr Thr Glu Thr Ile Gln Ser Asn Ala Asn Leu Ala Pro Leu Pro Pro
 1               5                  10                  15


cat gtg cca gag cac ctg gta ttc gac ttc gac atg tac aat ccg tcg    96
His Val Pro Glu His Leu Val Phe Asp Phe Asp Met Tyr Asn Pro Ser
                20                  25                  30


aat ctg tct gcc ggc gtg cag gag gcc tgg gca gtt ctg caa gaa tca   144
Asn Leu Ser Ala Gly Val Gln Glu Ala Trp Ala Val Leu Gln Glu Ser
                35                  40                  45


aac gta ccg gat ctg gtg tgg act cgc tgc aac ggc gga cac tgg atc   192
Asn Val Pro Asp Leu Val Trp Thr Arg Cys Asn Gly Gly His Trp Ile
            50                  55                  60


gcc act cgc ggc caa ctg atc cgt gag gcc tat gaa gat tac cgc cac   240
Ala Thr Arg Gly Gln Leu Ile Arg Glu Ala Tyr Glu Asp Tyr Arg His
65                  70                  75                  80


ttt tcc agc gag tgc ccg ttc atc cct cgt gaa gcc ggc gaa gcc tac   288
Phe Ser Ser Glu Cys Pro Phe Ile Pro Arg Glu Ala Gly Glu Ala Tyr
                85                  90                  95
```

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```
    gac ttc att ccc acc tcg atg gat ccg ccc gag cag cgc cag ttt cgt    336
    Asp Phe Ile Pro Thr Ser Met Asp Pro Pro Glu Gln Arg Gln Phe Arg
                100                 105                 110


5   gcg ctg gcc aac caa gtg gtt ggc atg ccg gtg gtg gat aag ctg gag    384
    Ala Leu Ala Asn Gln Val Val Gly Met Pro Val Val Asp Lys Leu Glu
                115                 120                 125


    aac cgg atc cag gag ctg gcc tgc tcg ctg atc gag agc ctg cgc ccg    432
    Asn Arg Ile Gln Glu Leu Ala Cys Ser Leu Ile Glu Ser Leu Arg Pro
                130                 135                 140


10  caa gga cag tgc aac ttc acc gag gac tac gcc gaa ccc ttc ccg ata    480
    Gln Gly Gln Cys Asn Phe Thr Glu Asp Tyr Ala Glu Pro Phe Pro Ile
    145                 150                 155                 160


    cgc atc ttc atg ctg ctc gca ggt cta ccg gaa gaa gat atc ccg cac    528
    Arg Ile Phe Met Leu Leu Ala Gly Leu Pro Glu Glu Asp Ile Pro His
                        165                 170                 175


15  ttg aaa tac cta acg gat cag atg acc cgt ccg gat ggc agc atg acc    576
    Leu Lys Tyr Leu Thr Asp Gln Met Thr Arg Pro Asp Gly Ser Met Thr
                180                 185                 190


    ttc gca gag gcc aag gag gcg ctc tac gac tat ctg ata ccg atc atc    624
    Phe Ala Glu Ala Lys Glu Ala Leu Tyr Asp Tyr Leu Ile Pro Ile Ile
                195                 200                 205


20  gag caa cgc agg cag aag ccg gga acc gac gct atc agc atc gtt gcc    672
    Glu Gln Arg Arg Gln Lys Pro Gly Thr Asp Ala Ile Ser Ile Val Ala
                210                 215                 220


25  aac ggc cag gtc aat ggg cga ccg atc acc agt gac gaa gcc aag agg    720
    Asn Gly Gln Val Asn Gly Arg Pro Ile Thr Ser Asp Glu Ala Lys Arg
    225                 230                 235                 240
```

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atg tgt ggc ctg tta ctg gtc ggc ggc ctg gat acg gtg gtc aat ttc    768
Met Cys Gly Leu Leu Leu Val Gly Gly Leu Asp Thr Val Val Asn Phe
                245             250             255
```

```
5   ctc agc ttc agc atg gag ttc ctg gcc aaa agc ccg gag cat cgc cag    816
    Leu Ser Phe Ser Met Glu Phe Leu Ala Lys Ser Pro Glu His Arg Gln
                    260             265             270
```

```
gag ctg atc gag cgt ccc gag cgt att cca gcc gct tgc gag gaa cta    864
Glu Leu Ile Glu Arg Pro Glu Arg Ile Pro Ala Ala Cys Glu Glu Leu
            275             280             285
```

```
10  ctc cgg cgc ttc tcg ctg gtt gcc gat ggc cgc atc ctc acc tcc gat    912
    Leu Arg Arg Phe Ser Leu Val Ala Asp Gly Arg Ile Leu Thr Ser Asp
                290             295             300
```

```
tac gag ttt cat ggc gtg caa ctg aag aaa ggt gac cag atc ctg cta    960
Tyr Glu Phe His Gly Val Gln Leu Lys Lys Gly Asp Gln Ile Leu Leu
15  305             310             315             320
```

```
ccg cag atg ctg tct ggc ctg gat gag cgc gaa aac gcc tgc ccg atg    1008
Pro Gln Met Leu Ser Gly Leu Asp Glu Arg Glu Asn Ala Cys Pro Met
                325             330             335
```

```
cac gtc gac ttc agt cgc caa aag gtt tca cac acc acc ttt ggc cac    1056
20  His Val Asp Phe Ser Arg Gln Lys Val Ser His Thr Thr Phe Gly His
                    340             345             350
```

```
ggc agc cat ctg tgc ctt ggc cag cac ctg gcc cgc cgg gaa atc atc    1104
Gly Ser His Leu Cys Leu Gly Gln His Leu Ala Arg Arg Glu Ile Ile
                355             360             365
```

```
25  gtc acc ctc aag gaa tgg ctg acc agg att cct gac ttc tcc att gcc    1152
    Val Thr Leu Lys Glu Trp Leu Thr Arg Ile Pro Asp Phe Ser Ile Ala
                370             375             380
```

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```
ccg ggt gcc cag att cag cac aag agc ggc atc gtc agc ggc gtg cag    1200
Pro Gly Ala Gln Ile Gln His Lys Ser Gly Ile Val Ser Gly Val Gln
385             390             395             400
```

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gca ctc cct ctg gtc tgg gat ccg gcg act acc aaa gcg gta           1242
Ala Leu Pro Leu Val Trp Asp Pro Ala Thr Thr Lys Ala Val
                405             410
```

<210> 2
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<212> DNA
<213> Bacillus megaterium
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<222> (1)..(3150)

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atg aca att aaa gaa atg cct cag cca aaa acg ttt gga gag ctt aaa    48
Met Thr Ile Lys Glu Met Pro Gln Pro Lys Thr Phe Gly Glu Leu Lys
    1               5               10              15
```

```
aat tta ccg tta tta aac aca gat aaa ccg gtt caa gct ttg atg aaa    96
Asn Leu Pro Leu Leu Asn Thr Asp Lys Pro Val Gln Ala Leu Met Lys
                20              25              30
```

```
att gcg gat gaa tta gga gaa atc ttt aaa ttc gag gcg cct ggt cgt    144
Ile Ala Asp Glu Leu Gly Glu Ile Phe Lys Phe Glu Ala Pro Gly Arg
            35              40              45
```

```
gta acg cgc tac tta tca agt cag cgt cta att aaa gaa gca tgc gat    192
Val Thr Arg Tyr Leu Ser Ser Gln Arg Leu Ile Lys Glu Ala Cys Asp
        50              55              60
```

```
gaa tca cgc ttt gat aaa aac tta agt caa gcg ctt aaa ttt gta cgt    240
Glu Ser Arg Phe Asp Lys Asn Leu Ser Gln Ala Leu Lys Phe Val Arg
    65              70              75              80
```

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gat ttt gca gga gac ggg tta ttt aca agc tgg acg cat gaa aaa aat   288
Asp Phe Ala Gly Asp Gly Leu Phe Thr Ser Trp Thr His Glu Lys Asn
            85   90   95

tgg aaa aaa gcg cat aat atc tta ctt cca agc ttc agt cag cag gca   336
Trp Lys Lys Ala His Asn Ile Leu Leu Pro Ser Phe Ser Gln Gln Ala
            100   105   110

atg aaa ggc tat cat gcg atg atg gtc gat atc gcc gtg cag ctt gtt   384
Met Lys Gly Tyr His Ala Met Met Val Asp Ile Ala Val Gln Leu Val
            115   120   125

caa aag tgg gag cgt cta aat gca gat gag cat att gaa gta ccg gaa   432
Gln Lys Trp Glu Arg Leu Asn Ala Asp Glu His Ile Glu Val Pro Glu
            130   135   140

gac atg aca cgt tta acg ctt gat aca att ggt ctt tgc ggc ttt aac   480
Asp Met Thr Arg Leu Thr Leu Asp Thr Ile Gly Leu Cys Gly Phe Asn
145   150   155   160

tat cgc ttt aac agc ttt tac cga gat cag cct cat cca ttt att aca   528
Tyr Arg Phe Asn Ser Phe Tyr Arg Asp Gln Pro His Pro Phe Ile Thr
                165   170   175

agt atg gtc cgt gca ctg gat gaa gca atg aac aag ctg cag cga gca   576
Ser Met Val Arg Ala Leu Asp Glu Ala Met Asn Lys Leu Gln Arg Ala
            180   185   190

aat cca gac gac cca gct tat gat gaa aac aag cgc cag ttt caa gaa   624
Asn Pro Asp Asp Pro Ala Tyr Asp Glu Asn Lys Arg Gln Phe Gln Glu
            195   200   205

gat atc aag gtg atg aac gac cta gta gat aaa att att gca gat cgc   672
Asp Ile Lys Val Met Asn Asp Leu Val Asp Lys Ile Ile Ala Asp Arg
            210   215   220

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```
    aaa gca agc ggt gaa caa agc gat gat tta tta acg cat atg cta aac    720
    Lys Ala Ser Gly Glu Gln Ser Asp Asp Leu Leu Thr His Met Leu Asn
    225             230             235             240


5   gga aaa gat cca gaa acg ggt gag ccg ctt gat gac gag aac att cgc    768
    Gly Lys Asp Pro Glu Thr Gly Glu Pro Leu Asp Asp Glu Asn Ile Arg
                245             250             255


    tat caa att att aca ttc tta att gcg gga cac gaa aca aca agt ggt    816
    Tyr Gln Ile Ile Thr Phe Leu Ile Ala Gly His Glu Thr Thr Ser Gly
                260             265             270


10  ctt tta tca ttt gcg ctg tat ttc tta gtg aaa aat cca cat gta tta    864
    Leu Leu Ser Phe Ala Leu Tyr Phe Leu Val Lys Asn Pro His Val Leu
                275             280             285


    caa aaa gca gca gaa gaa gca gca cga gtt cta gta gat cct gct cca    912
    Gln Lys Ala Ala Glu Glu Ala Ala Arg Val Leu Val Asp Pro Ala Pro
15  290             295             300


    agc tac aaa caa gtc aaa cag ctt aaa tat gtc ggc atg gtc tta aac    960
    Ser Tyr Lys Gln Val Lys Gln Leu Lys Tyr Val Gly Met Val Leu Asn
    305             310             315             320


    gaa gcg ctg cgc tta tgg cca act gct cct gcg ttt tcc cta tat gca   1008
20  Glu Ala Leu Arg Leu Trp Pro Thr Ala Pro Ala Phe Ser Leu Tyr Ala
                325             330             335


    aaa gaa gat acg gtg ctt gga gga gaa tat cct tta gaa aaa ggc gac   1056
    Lys Glu Asp Thr Val Leu Gly Gly Glu Tyr Pro Leu Glu Lys Gly Asp
                340             345             350


25  gaa cta atg gtt ctg att cct cag ctt cac cgt gat aaa aca att tgg   1104
    Glu Leu Met Val Leu Ile Pro Gln Leu His Arg Asp Lys Thr Ile Trp
                355             360             365
```

```
    gga gac gat gtg gaa gag ttc cgt cca gag cgt ttt gaa aat cca agt   1152
    Gly Asp Asp Val Glu Glu Phe Arg Pro Glu Arg Phe Glu Asn Pro Ser
        370             375             380


    gcg att ccg cag cat gcg ttt aaa ccg ttt gga aac ggt cag cgt gcg   1200
5   Ala Ile Pro Gln His Ala Phe Lys Pro Phe Gly Asn Gly Gln Arg Ala
        385             390             395             400


    tgt atc ggt cag cag ttc gct ctt cat gaa gca acg ctg gta ctt ggt   1248
    Cys Ile Gly Gln Gln Phe Ala Leu His Glu Ala Thr Leu Val Leu Gly
                405             410             415


10  atg atg cta aaa cac ttt gac ttt gaa gat cat aca aac tac gag ctg   1296
    Met Met Leu Lys His Phe Asp Phe Glu Asp His Thr Asn Tyr Glu Leu
                420             425             430


    gat att aaa gaa act tta acg tta aaa cct gaa ggc ttt gtg gta aaa   1344
    Asp Ile Lys Glu Thr Leu Thr Leu Lys Pro Glu Gly Phe Val Val Lys
15          435             440             445


    gca aaa tcg aaa aaa att ccg ctt ggc ggt att cct tca cct agc act   1392
    Ala Lys Ser Lys Lys Ile Pro Leu Gly Gly Ile Pro Ser Pro Ser Thr
        450             455             460


    gaa cag tct gcc aaa aaa gca cgc aaa aag gca gaa aac gct cat aat   1440
20  Glu Gln Ser Ala Lys Lys Ala Arg Lys Lys Ala Glu Asn Ala His Asn
    465             470             475             480


    acg ccg ctg ctt gtg cta tac ggt tca aat atg gga aca gct gaa gga   1488
    Thr Pro Leu Leu Val Leu Tyr Gly Ser Asn Met Gly Thr Ala Glu Gly
                485             490             495


25  acg gcg cgt gat tta gca gat att gca atg agc aaa gga ttt gca ccg   1536
    Thr Ala Arg Asp Leu Ala Asp Ile Ala Met Ser Lys Gly Phe Ala Pro
                500             505             510
```

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cag gtc gca acg ctt gat tca cac gcc gga aat ctt ccg cgc gaa gga   1584
Gln Val Ala Thr Leu Asp Ser His Ala Gly Asn Leu Pro Arg Glu Gly
         515   520   525

5   gct gta tta att gta acg gcg tct tat aac ggt cat ccg cct gat aac   1632
     Ala Val Leu Ile Val Thr Ala Ser Tyr Asn Gly His Pro Pro Asp Asn
              530   535   540

     gca aag caa ttt gtc gac tgg tta gac caa gcg tct gct gat gaa gta   1680
     Ala Lys Gln Phe Val Asp Trp Leu Asp Gln Ala Ser Ala Asp Glu Val
     545   550   555   560

10   aaa ggc gtt cgc tac tcc gta ttt gga tgc ggc gat aaa aac tgg gct   1728
     Lys Gly Val Arg Tyr Ser Val Phe Gly Cys Gly Asp Lys Asn Trp Ala
                  565   570   575

     act acg tat caa aaa gtg cct gct ttt atc gat gaa acg ctt gcc gct   1776
     Thr Thr Tyr Gln Lys Val Pro Ala Phe Ile Asp Glu Thr Leu Ala Ala
15   580   585   590

     aaa ggg gca gaa aac atc gct gac cgc ggt gaa gca gat gca agc gac   1824
     Lys Gly Ala Glu Asn Ile Ala Asp Arg Gly Glu Ala Asp Ala Ser Asp
              595   600   605

     gac ttt gaa ggc aca tat gaa gaa tgg cgt gaa cat atg tgg agt gac   1872
20   Asp Phe Glu Gly Thr Tyr Glu Glu Trp Arg Glu His Met Trp Ser Asp
              610   615   620

     gta gca gcc tac ttt aac ctc gac att gaa aac agt gaa gat aat aaa   1920
     Val Ala Ala Tyr Phe Asn Leu Asp Ile Glu Asn Ser Glu Asp Asn Lys
     625   630   635   640

25   tct act ctt tca ctt caa ttt gtc gac agc gcc gcg gat atg ccg ctt   1968
     Ser Thr Leu Ser Leu Gln Phe Val Asp Ser Ala Ala Asp Met Pro Leu
                  645   650   655

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```
      gcg aaa atg cac ggt gcg ttt tca acg aac gtc gta gca agc aaa gaa   2016
      Ala Lys Met His Gly Ala Phe Ser Thr Asn Val Val Ala Ser Lys Glu
                  660             665             670


      ctt caa cag cca ggc agt gca cga agc acg cga cat ctt gaa att gaa   2064
 5    Leu Gln Gln Pro Gly Ser Ala Arg Ser Thr Arg His Leu Glu Ile Glu
                  675             680             685


      ctt cca aaa gaa gct tct tat caa gaa gga gat cat tta ggt gtt att   2112
      Leu Pro Lys Glu Ala Ser Tyr Gln Glu Gly Asp His Leu Gly Val Ile
                  690             695             700


10    cct cgc aac tat gaa gga ata gta aac cgt gta aca gca agg ttc ggc   2160
      Pro Arg Asn Tyr Glu Gly Ile Val Asn Arg Val Thr Ala Arg Phe Gly
      705             710             715             720


      cta gat gca tca cag caa atc cgt ctg gaa gca gaa gaa gaa aaa tta   2208
      Leu Asp Ala Ser Gln Gln Ile Arg Leu Glu Ala Glu Glu Glu Lys Leu
15                725             730             735


      gct cat ttg cca ctc gct aaa aca gta tcc gta gaa gag ctt ctg caa   2256
      Ala His Leu Pro Leu Ala Lys Thr Val Ser Val Glu Glu Leu Leu Gln
                  740             745             750


      tac gtg gag ctt caa gat cct gtt acg cgc acg cag ctt cgc gca atg   2304
20    Tyr Val Glu Leu Gln Asp Pro Val Thr Arg Thr Gln Leu Arg Ala Met
                  755             760             765


      gct gct aaa acg gtc tgc ccg ccg cat aaa gta gag ctt gaa gcc ttg   2352
      Ala Ala Lys Thr Val Cys Pro Pro His Lys Val Glu Leu Glu Ala Leu
                  770             775             780


25    ctt gaa aag caa gcc tac aaa gaa caa gtg ctg gca aaa cgt tta aca   2400
      Leu Glu Lys Gln Ala Tyr Lys Glu Gln Val Leu Ala Lys Arg Leu Thr
      785             790             795             800
```

```
atg ctt gaa ctg ctt gaa aaa tac ccg gcg tgt gaa atg aaa ttc agc    2448
Met Leu Glu Leu Leu Glu Lys Tyr Pro Ala Cys Glu Met Lys Phe Ser
                805                 810                 815


gaa ttt atc gcc ctt ctg cca agc ata cgc ccg cgc tat tac tcg att    2496
Glu Phe Ile Ala Leu Leu Pro Ser Ile Arg Pro Arg Tyr Tyr Ser Ile
                820                 825                 830


tct tca tca cct cgt gtc gat gaa aaa caa gca agc atc acg gtc agc    2544
Ser Ser Ser Pro Arg Val Asp Glu Lys Gln Ala Ser Ile Thr Val Ser
                835                 840                 845


gtt gtc tca gga gaa gcg tgg agc gga tat gga gaa tat aaa gga att    2592
Val Val Ser Gly Glu Ala Trp Ser Gly Tyr Gly Glu Tyr Lys Gly Ile
                850                 855                 860


gcg tcg aac tat ctt gcc gag ctg caa gaa gga gat acg att acg tgc    2640
Ala Ser Asn Tyr Leu Ala Glu Leu Gln Glu Gly Asp Thr Ile Thr Cys
865                 870                 875                 880


ttt att tcc aca ccg cag tca gaa ttt acg ctg cca aaa gac cct gaa    2688
Phe Ile Ser Thr Pro Gln Ser Glu Phe Thr Leu Pro Lys Asp Pro Glu
                885                 890                 895


acg ccg ctt atc atg gtc gga ccg gga aca ggc gtc gcg ccg ttt aga    2736
Thr Pro Leu Ile Met Val Gly Pro Gly Thr Gly Val Ala Pro Phe Arg
                900                 905                 910


ggc ttt gtg cag gcg cgc aaa cag cta aaa gaa caa gga cag tca ctt    2784
Gly Phe Val Gln Ala Arg Lys Gln Leu Lys Glu Gln Gly Gln Ser Leu
                915                 920                 925


gga gaa gca cat tta tac ttc ggc tgc cgt tca cct cat gaa gac tat    2832
Gly Glu Ala His Leu Tyr Phe Gly Cys Arg Ser Pro His Glu Asp Tyr
                930                 935                 940
```

```
ctg tat caa gaa gag ctt gaa aac gcc caa agc gaa ggc atc att acg   2880
Leu Tyr Gln Glu Glu Leu Glu Asn Ala Gln Ser Glu Gly Ile Ile Thr
945              950              955              960
```

```
ctt cat acc gct ttt tct cgc atg cca aat cag ccg aaa aca tac gtt   2928
Leu His Thr Ala Phe Ser Arg Met Pro Asn Gln Pro Lys Thr Tyr Val
            965              970              975
```

```
cag cac gta atg gaa caa gac ggc aag aaa ttg att gaa ctt ctt gat   2976
Gln His Val Met Glu Gln Asp Gly Lys Lys Leu Ile Glu Leu Leu Asp
                980              985              990
```

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caa gga gcg cac ttc tat att tgc gga gac gga agc caa atg gca cct   3024
Gln Gly Ala His Phe Tyr Ile Cys Gly Asp Gly Ser Gln Met Ala Pro
            995              1000             1005
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gcc gtt gaa gca acg ctt atg aaa agc tat gct gac gtt cac caa gtg   3072
Ala Val Glu Ala Thr Leu Met Lys Ser Tyr Ala Asp Val His Gln Val
    1010             1015             1020
```

```
agt gaa gca gac gct cgc tta tgg ctg cag cag cta gaa gaa aaa ggc   3120
Ser Glu Ala Asp Ala Arg Leu Trp Leu Gln Gln Leu Glu Glu Lys Gly
1025             1030             1035             1040
```

```
cga tac gca aaa gac gtg tgg gct ggg taa                           3150
Arg Tyr Ala Lys Asp Val Trp Ala Gly
            1045             1050
```